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SPOOR & FISHER

REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978
APPLICATION FOR A PATENT
AND ACKNOWLEDGEMENT OF RECEIPT
(Section 30 (1) - Regulation 22)

REPUBLIC OF SOUTH AFRICA
REVENUE
R 0266.00
HASR 711
INXDMSTE
REPUBLIC VAN SUID AFRIKA
S & F REFERENCE

The granting of a patent is hereby requested by the undermentioned applicant on the basis of the present application filed in duplicate

OFFICIAL APPLICATION NO.
21 01 2002/8394

PA133547/ZA

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TITLE OF INVENTION
54 ADVANCE WORKING OR MINING MACHINE FOR MINING ROCK

THE APPLICANT CLAIMS PRIORITY AS SET OUT ON THE ACCOMPANYING FORM P.2. THE EARLIEST PRIORITY CLAIM IS:
COUNTRY: AT NUMBER: A 1510/2001 DATE: 24 SEP 2001

THIS APPLICATION IS FOR A PATENT OF ADDITION TO PATENT APPLICATION NO.

21 01

THIS APPLICATION IS A FRESH APPLICATION IN TERMS OF SECTION 37 AND IS BASED ON APPLICATION NO.

21 01

THIS APPLICATION IS ACCOMPANIED BY:

- ☒ 1. Two copies of a complete specification of 9 pages.
- ☒ 2. Drawings of 3 sheets.
- ☒ 3. Publication particulars and abstract (Form P.8 in duplicate).
- ☒ 4. A copy of Figure 1 of the drawings for the abstract.
- ☒ 5. Assignment of invention.
- ☒ 6. Certified priority document.
- ☒ 7. Translation of the priority document.
- ☐ 8. Assignment of priority rights.
- ☐ 9. A copy of the Form P.2 and the specification of S.A. Patent Application No.
- ☒ 10. Declaration and power of attorney on Form P.3.
- ☐ 11. Request for ante-dating on Form P.4.
- ☐ 12. Request for classification on Form P.9.
- ☒ 13. Form P.2 in duplicate.
- ☐ 14. Other.

74 ADDRESS FOR SERVICE: SPOOR & FISHER, SANDTON

Dated: 12 August 2002


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PATENT ATTORNEYS FOR THE APPLICANT(S)

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HANDELSMERKE EN OUTEURSREG
REGISTRAR OF PATENTS

REPUBLIC OF SOUTH AFRICA
PATENTS ACT, 1978

COMPLETE SPECIFICATION

(Section 30(1) - Regulation 28)

OFFICIAL APPLICATION NO.

21	01	2002/6394
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LODGING DATE

22	12 AUG 2002
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INTERNATIONAL CLASSIFICATION

51	E21C
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FULL NAMES OF APPLICANT

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TITLE OF INVENTION

54	ADVANCE WORKING OR MINING MACHINE FOR MINING ROCK
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The invention relates to an advance-working or mining machine for mining rock, with disc or roller tools operating according to the undercut principle, which are mounted for rotation on a swivelling jib arm of the machine, with a head carrying the tools, the axis of rotation of which extends essentially in the direction of the jib arm axis, wherein the axis of rotation of the head carrying the tools on the machine frame is mounted swivelling around an axis that crosses the axis of the jib arm and in the advance-working direction extends in front of the swivelling axis of the jib arm arranged transversely to the advance-working direction, and the swivel bearing of the jib arm is arranged on a carriage that can be moved in the longitudinal direction of the machine frame.

From the DE 39 05 737 A1 a method is already known for drilling galleries, tunnels, caverns or the like, and especially arch profiles, with which a machine is used, the drill heads of which are fastened to an arm that can swivel and move in all directions and are provided with undercutting tools. Such undercutting tools make it possible, especially in the case of hard rock, to increase the cutting capacity by a considerably greater amount of broken material, wherein with such tools that operate according to the undercut principle, due to the large pieces that are cut off, the advance-working or mining takes place not only more rapidly and rationally, but also with considerably lesser dust formation. Especially when the rock is very hard and has a higher quartz content, such a breaking-out using tools that operate according to the undercut principle, as a rule is more economical than a conventional hewing, with which the material is only cut. Roller or milling drill tools, with which from the middle of a gallery, tunnel or shaft, without fore-bore hole a cutting away takes place in layers from the inside to the outside, are also described in DE 41 42 800 A1. With this apparatus layer after layer is cut away radially from the inside to the outside in an undercutting manner, wherein the tools are fastened to a rotatably driven drill head. For mining lower seams, low-construction devices have already become known, which are equipped with

milling heads and as a rule have an own drive. However, with such known devices, which are also called "Narrow Reef Miners", the material was as a rule cut.

From the older Austrian application W0 02/01045 an advance-working or mining machine of the type mentioned at the outset has already become known, with which particularly low seams can be mined efficiently and economically using the undercut principle, and with which it should also be possible to mine hard material in the gallery along a seam by remote control. According to the invention this construction known from the older application is now to be improved further in the sense that the advance-working machine can be stabilised better during the cutting and in the case of a particularly irregular course of the seam can be made to follow same better. Especially the manoeuvrability of the machine and the exact incidence of the cutting plane are to be improved and at the same time it should be prevented that in the case of strong vibrations due to a fragile roof, the adjusted orientation cannot be exactly maintained.

To address this object, the construction according to the invention essentially consists in that the machine frame can be braced between the floor and roof by a plurality of props, wherein props are arranged on both sides of the longitudinal centre plane of the machine frame, in that on the carriage in the area of the swivelling axis of the swivel mechanism at least one prop is arranged which can be set against the roof and the floor, and in that the swivel cylinders for swivelling the jib arm extend V-shaped and, seen from above, are arranged inside the support props. Due to the fact that in place of the roof caps provided with the older machine, which could be moved out essentially parallel to the longitudinal centre plane of the machine frame, now a plurality of props is provided, the distance of which from the longitudinal centre plane preferably decreases as the distance from the swivelling axis increases, a short construction of the frame is

obtained, with which, when the props are moved in, the manoeuvrability and curve-going ability is increased considerably and at the same time a better distribution of the forces introduced into the floor and roof respectively can take place. Small stroke adjustments of the rear support devices suffice to fix the advance-working machine in its position. To this end the construction is advantageously provided in such a way that on both sides of the longitudinal centre plane of the machine frame an uneven number of three or more props is arranged, wherein in each instance a number of props can be set against the roof, which number is greater than the number of props that can move out against the floor, wherein due to the fact that an uneven number of props is provided and in each instance a larger number of these props can be set against the roof, also in the case of fragile roofs, which generally can lead to position displacements, the stability is improved considerably. The props are preferably arranged symmetrically in the longitudinal direction, so that without further control measures a uniform moving of the parallel-switched props is obtained. First the moving out of the prop against the floor takes place, wherein after moving the two props against the roof, a uniform bracing is ensured without changes in position of the advance-working machine.

An improvement in the stabilisation during the cutting can be obtained according to the invention in that in the area of the swivelling axis of the swivel mechanism at least one prop is provided, which can be set against the roof and the floor. Such an additional support prop arranged on the front section of the movable carriage part, and in particular in the vertical swivelling axis of the jib arm, provides a separate vertical supporting against the roof and floor in the immediate cutting area, wherein this support is activated only after the opening up operation, which normally amounts to approximately 60 mm, and stabilises the jib arm during the further cutting work in the vertical direction. The lateral V-shaped prop units arranged on the stationary frame of the advance-working machine, of which in the case of a total number of six prop units in each instance four prop units are

pressed against the roof and two prop units against the floor, make it possible to increase the contact surface and ensure less stress on the roof, wherein the supporting action is retained unchanged also when the carriage is moved out relative to the frame. With such a plurality of prop units, the positioning of the machine can be controlled more accurately, wherein an exact positioning of the machine prior to the opening-up cutting operation can take place in a particularly simple manner in that at the rear end of the carriage facing away from the swivel bearing two spreader feet are arranged, which can swivel and be pressed separately against the floor. Whereas with the known arrangement, only an additional support prop was provided in the rear part of the machine, the present arrangement of two spreader feet ensures that the machine can be stabilised also when it is tilted around the longitudinal axis of the machine, and can be placed in the respective inclined position. An optimal adaptation to the seam can also be obtained here in that the swivelling axes of the spreader feet are mounted in a carrier that can be moved transversely to the longitudinal axis of the machine.

As is also already the case with the original machine, a loading ramp is provided on the movable carriage, and suitable clearing devices are provided on the jib arm. To improve the loading operation, the construction according to the invention is now such that the jib arm carries flaps directed towards the loading chute, which can swivel against a stop and when swivelled against the stop push material towards the conveyor, and a further shovel that can be swivelled separately from the jib arm is provided for clearing the floor, the swivelling path of which extends over a central angle of less than 90° from the side of the machine frame opposite the opening-up position. The separate loading raker, which can be mounted for rotation in the swivelling axis of the jib, can for example become operative over a central angle area of approximately 45° and in this way can push material that is broken out or cut away at the sides into a position from where the swivelling flaps connected to the jib arm permit a reliable removal to the laterally arranged conveyor.

To further improve the manoeuvrability and curve-going ability of the advance-working or mining machine according to the invention, the construction is advantageously such that at the rear end of the carriage, facing away from the swivel bearing, a power supply unit is provided, which can swivel around an essentially vertical swivelling axis. In conjunction with the, in projection onto the floor, essentially V-shaped arranged lateral prop units and the swivelling power supply unit, narrow curve radii can be negotiated also by longer machines, so that the exact positioning and easy manoeuvrability is further simplified.

In the following the invention will be explained in greater detail with reference to exemplified embodiments illustrated in the drawings. In these, Figure 1 shows a top view onto the machine according to the invention, Figure 2 a first perspective view and Figure 3 a second perspective view of the machine according to the invention.

In Fig. 1 a machine frame 1 is illustrated, on which a carriage 2 is mounted that can move longitudinally in the direction of the double arrow 3. At the rear end of the carriage 2 an abutment block is provided, on which swivel-cylinders 4 and 5 are arranged for swivelling a swivel mechanism 6 around a swivelling axis 7 that crosses the advance-working direction 10. The carriage consists of the rear abutment block and a front bearing block 33 with the swivel bearing 6 and the two guide rods 34. The moving of the carriage relative to the frame takes place by means of the cylinder piston unit 35. To the swivel bearing 6 a jib arm 8 is fastened, the axis 20 of which, the same as the drill head axis 9 of the cutting head 13, in the advance-working direction 10 lies in front of the swivelling axis 7 of the swivel mechanism 6. The jib may, however, also be made cranked or bent. The alignment of the drill head axis ensures that during the swivelling of the swivel mechanism 6 in the direction of the double arrow 11, over the entire swivelling angle of approximately 120° a suitable free-cutting angle α of the cutting discs 12 of a cutting head 13 is ensured. At the front end of the carriage 2, which is adjacent to the work face, a floatingly mounted loading chute 14 can be

seen, via which material can be pushed in the direction of the arrows 11 and 15 onto a conveyor 16. The clearing shovel 30 is arranged swivelling around the axis 7, and is actuated by the swivel-cylinder 32 over a swivelling range of about 45°. On the machine frame 1 a plurality of props 17, 18, 19 is now provided, which can be braced between floor and roof, wherein the props 17, 18, 19 are arranged on both sides of the longitudinal centre plane 21 of the machine frame 1 at a short distance from one another, the distance from the longitudinal centre plane 21 decreasing as the distance from the swivelling axis 7 increases. The props 17 and 19 can be braced against the roof and the prop 18 against the floor. A further prop 22 is arranged in the area of the swivelling axis 7 of the swivel mechanism 6, so as to stabilise the swivel mechanism or jib arm in the vertical direction during the cutting operation.

At the rear end of the carriage 2 two spreader feet 23, 24 are provided, which can swivel and be pressed against the floor separately. The spreader feet 23, 24 are set by means of hydraulic cylinders 25, 26, wherein the carrier carrying the swivelling axes of the spreader feet can be moved sideways in a suitable guide, transversely to the longitudinal axis of the machine, by means of a hydraulic cylinder piston unit 27, so that when the spreader feet 23, 24 have been moved out, the carriage and accordingly the machine frame 1 can be moved sideways provided that the support props 17, 18, 19 have been moved in. By a different setting of the spreaders 23, 24, in addition a swivelling of the machine around its longitudinal axis is possible.

A power supply unit 28 is furthermore attached to the rear end of the carriage 2, which can be swivelled around an essentially vertical swivelling axis. The suitable adjusting of the swivelling angle takes place with the aid of the hydraulic cylinder piston unit 29.

As already mentioned, suitable clearing devices 14 are arranged on the jib arm 8, and a further shovel 30, which can be swivelled separately from the jib arm 8, is

provided for clearing the floor. The shovel 30 can bring material that is broken out or cut away at the sides into a position, from where the clearing flaps 31 linked to the jib arm 8 permit a reliable removal to the laterally arranged conveyor 16.

In Figures 2 and 3, which illustrate perspective views of the embodiment according to Fig. 1, the same components are indicated by the same reference numerals.

* * *

CLAIMS

1. Advance-working or mining machine for mining rock, with disc or roller tools operating according to the undercut principle, which are mounted for rotation on a swivelling jib arm of the machine, with a head carrying the tools, the axis of rotation of which extends essentially in the direction of the jib arm axis, wherein the head carrying the tools on the machine frame is mounted for swivelling around an axis that crosses the axis of the jib arm and in the advance-working direction extends in front of the swivelling axis of the jib arm arranged transversely to the advance-working direction, and a swivel bearing of the jib arm is arranged on a carriage that can be moved in the longitudinal direction of the machine frame, characterised in that the machine frame can be braced between a floor and a roof by a plurality of props, wherein the props are arranged on both sides of the longitudinal centre plane of the machine frame, in that on the carriage in the area of the swivelling axis of the swivel mechanism at least one prop is arranged which can be set against the roof and the floor, and in that swivel cylinders for swivelling the jib arm extend V-shaped and, seen from above, are arranged inside the support props.
2. Advance-working or mining machine according to claim 1, characterised in that the distance of the props from the longitudinal centre plane decreases as the distance of the props from the swivelling axis of the swivel mechanism increases.
3. Advance-working or mining machine according to claim 1 or 2, characterised in that on both sides of the longitudinal centre plane of the machine frame an uneven number of three or more props is arranged, wherein in each instance a number of props can be set against the roof, which number is greater than the number of props that can move out against the floor.
4. Advance-working or mining machine according to any one of the claims 1, 2 or 3, characterised in that the props are arranged symmetrically in the longitudinal direction of the machine.

5. Advance-working or mining machine according to any one of the claims 1 to 4, characterised in that the jib arm carries flaps directed towards a loading chute, which can swivel against a stop and when swivelled against the stop push material towards a conveyor, and a further shovel that can be swivelled separately from the jib arm is provided for clearing the floor, the swivelling path of which extends over a central angle of less than 90° from the side of the machine frame opposite an opening-up position.
6. Advance-working or mining machine according to any one of the claims 1 to 5, characterised in that at a rear end of the carriage two spreader feet are provided, which can swivel and be pressed against the floor separately.
7. Advance-working or mining machine according to claim 6, characterised in that the spreader feet are mounted in a carrier that can be moved transversely to the longitudinal axis of the machine.
8. Advance-working or mining machine according to any one of the claims 1 to 7, characterised in that at a rear end of the carriage, facing away from the swivel bearing, a power supply unit is provided, which can swivel around an essentially vertical swivelling axis.

DATED THIS 12TH DAY OF AUGUST 2002

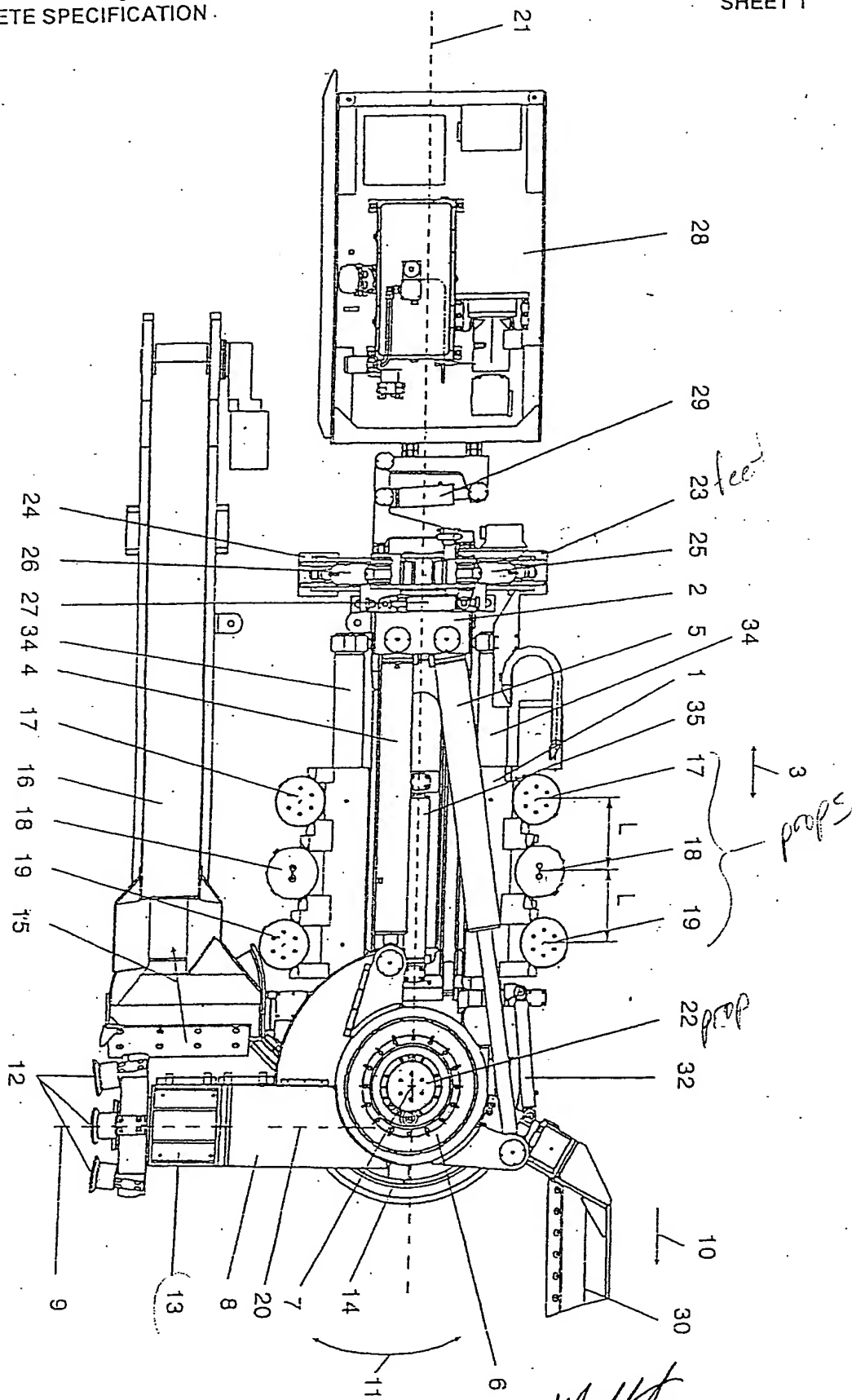

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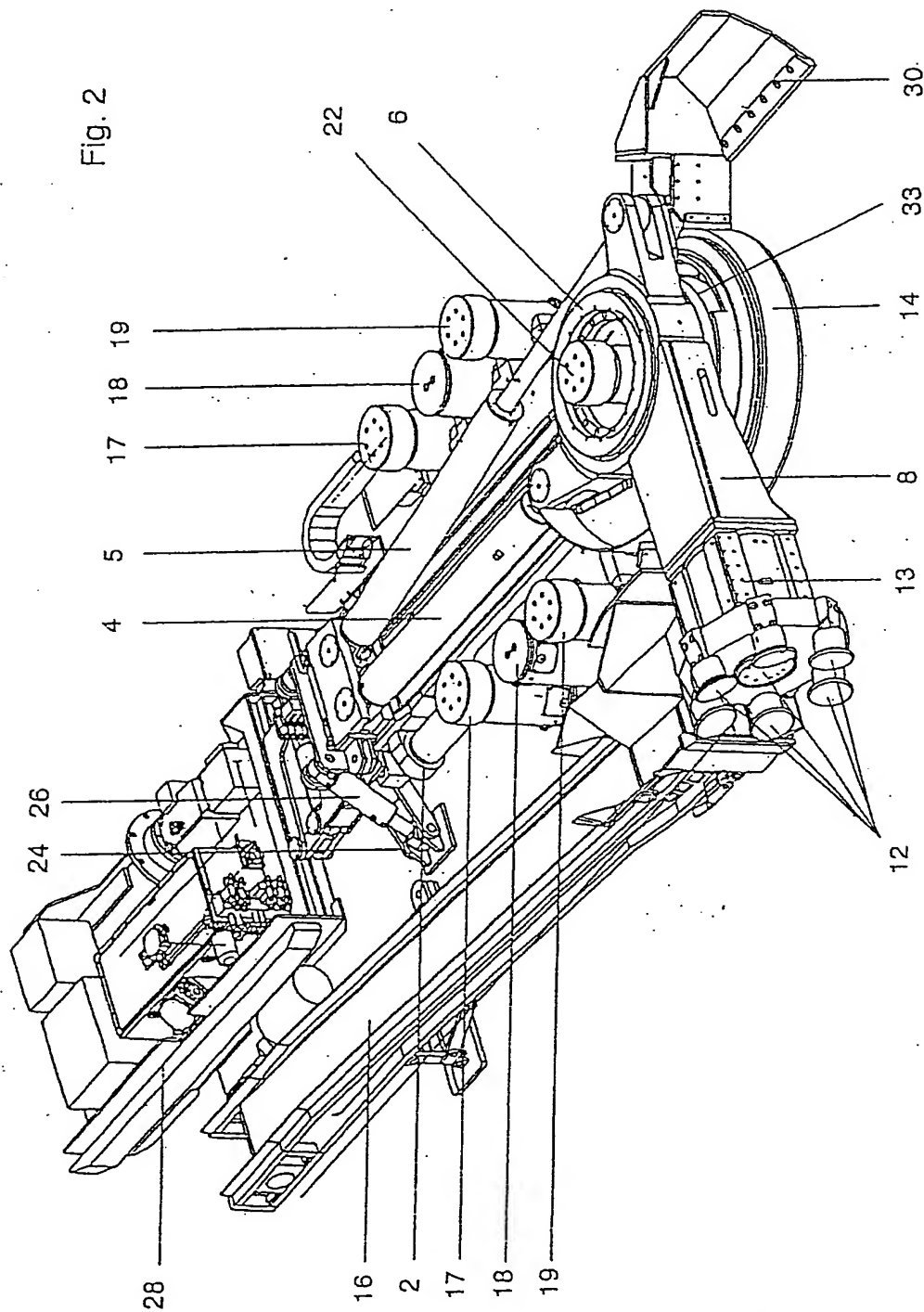
VOEST-ALPINE Bergtechnik Gesellschaft m.b.H.
COMPLETE SPECIFICATION.

3 SHEETS
SHEET 1

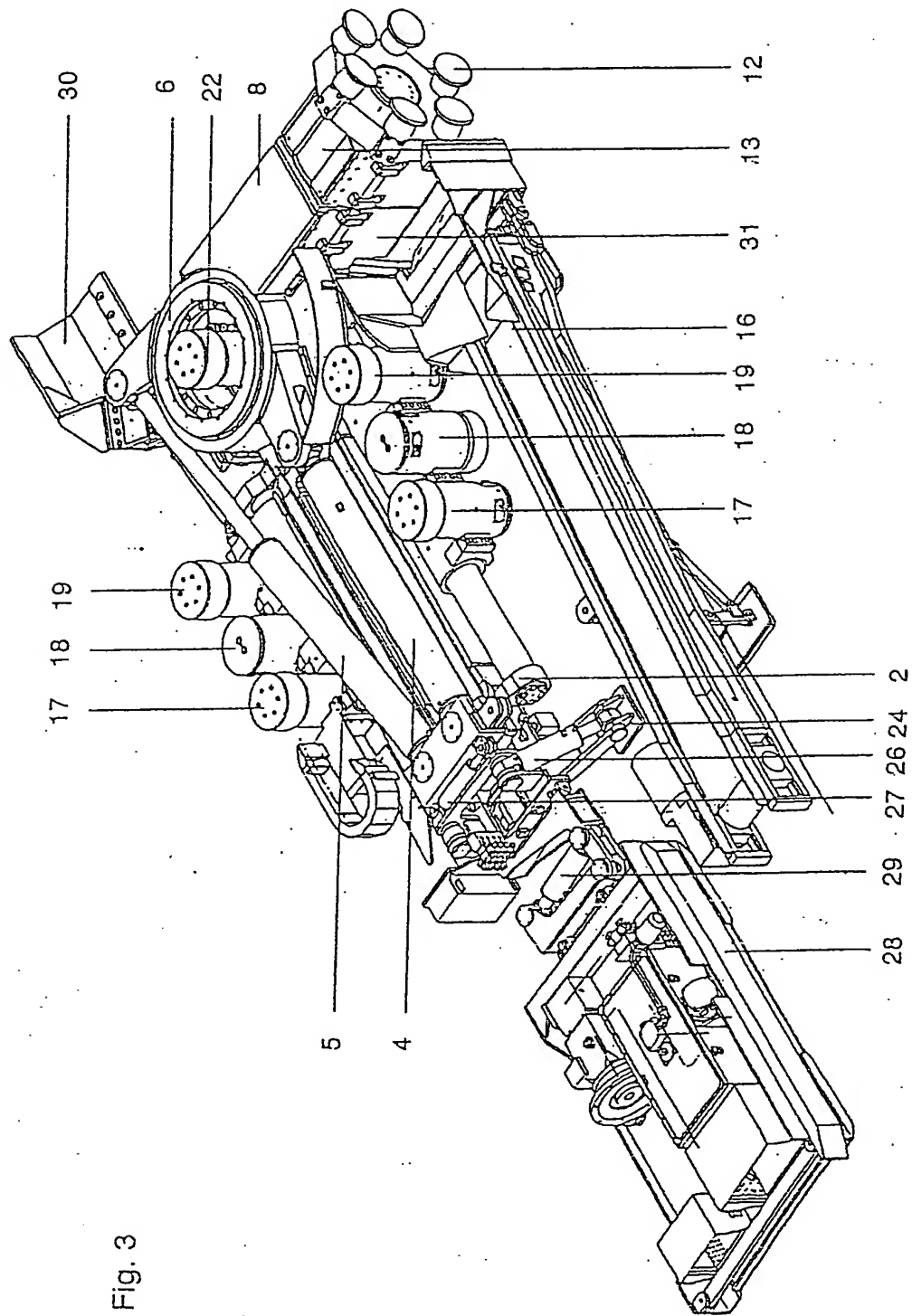
Fig. 1



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